



Certificate of Calibration #xxx

Item

Nuvap ProSystem Nx

Model

N1Basic, N1Radon, N1Plus, N1Pro

Manufacturer

Nuvap

Serial number / MAC Address

F8F005F0xxxx

Calibration procedure N°xxxxxx

This calibration certificate reports the traceability to national/international standards, which realize the physical units of measurements according to the International System of Units (SI). Verification of traceability is guaranteed by mentioning used equipment included in the measurement chain. This equipment includes reference standard directly traceable to standard and working standard calibrated by the calibration laboratory of Nuvap Safety Test Solutions by means of reference standard or by other calibration laboratory. The measurement uncertainties stated in this document are estimated at the level of standard deviation. The uncertainties are calculated in conformity to the ISO Guide 'Guide to the expression of uncertainty in measurement'.

Date(s) of measurements _____

Result of calibration _____

Date of issue

Measure operator

Process Owner

This calibration certificate may not be reproduced Calibration certificate without signature are not valid. The user is recommended to have the object recalibrated at appropriate intervals.

The calibration has been carried out at an ambient temperature of $(20 \pm 3)^{\circ}\text{C}$ and at a relative humidity of $(50 \pm 10)\%$.

Calibration Method

The calibration method for all Nuvap sensors is described below.

Each sensor is individually analyzed, mounted on the electronic board and each device is finally tested after the factory assembly. Nuvap has defined specific calibration procedures, depending on the type of sensor.

For gas sensors, as indicated on the manufacturer's data-sheet, the procedure includes, first of all, heating in array for 3 consecutive days, then mounting on the device and exposure to gases (CH_4 , CO , CO_2 , CH_2O , ETOH ...) with known concentrations. At this point, Nuvap devices are exposed to pure air to calibrate the zero point of the selected gases.

Radon sensors are individually tested, in batches of 50 pieces, in a Radon testing room in ENEA premises, at a known concentration of Radon gas.

Electromagnetic field sensors are calibrated in Cubit labs, a research institute of the University of Pisa, in a semi-anechoic chamber equipped with EC certification for electromagnetic emissions.

At the end of these calibration procedures, an automatic test generates a report for each device, indicating the "passed" value if the sensor has been properly calibrated and installed on board. All these procedures are performed directly before the packaging of Nuvap devices at PSM, Arezzo, Italy.

Measurement Method

The device takes 4 measurements every hour for each monitored pollutant. Then it calculates an average, minimum and maximum value, and those values are dispatched to the server. Each average value has different calculation rules.

Thresholds are referred to legislation or explosive risks.

The statement of uncertainty does not have any implication or include any estimation as to the long term stability of the calibrated monitor. The expanded uncertainties are given below

Uncertainty of Measurements

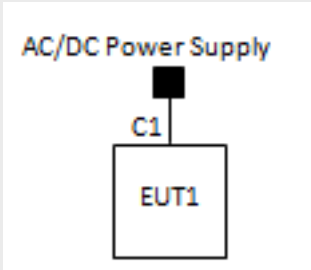
Sensor	% Error	Notes
EMF HF	16 % for frequencies up to 1 MHz 10 % from 1 MHz to 300 MHz 15% from 300 MHz to 3 GHz	
EMF LF	14 % from 0 to 3000 nT 10 % from 3000 nT to 7000 nT 5% from 7000 nT to 12000 <5 % from 12000 nT to 14000 nT	
Radon Sensor	from - 10% to + 10%	
Ionizing Rad.	from - 10% to + 10%	
Dust	from - 6% to + 6%	
VOC	from - 15% to + 15%	
Methane	from - 12% to + 12%	
Noise	12%	
Temperature & Humidity	12%	
CO	from 0 % to 10 %	
CO2	from 2 % to 13 %	
Formaldehyde	from 7 % to 10 %	

Identification of Testing Laboratory

Labs	Nuvap Srl Via Giuntini,13 56021 Cascina (PI) Italy PSM S.r.l. Via Calamandrei, 91 52100 Arezzo Italy
Certification	UNI EN ISO 9001:2008 & UNI EN ISO 13485:2012

Results validity

The results contained in this report are valid for the specified model and serial number. The manufacturer is responsible to ensure that all product models reflect the detailed requirements of this report.

Brand	NUVAP S.r.l.				
Model	N1Basic, N1Radon, N1Plus, N1Pro				
Serial N°	--				
ID-Lab	EUT1				
Power Supply	<input checked="" type="checkbox"/> AC with Switching Adapter (Sunny Computer Technology Europe s.r.o. Model: SYS1381-1005- W2E) <input checked="" type="checkbox"/> monofase input: V: 100-240 VAC / 0,5A / 50-60 Hz Output: V: 5 VDC / 2 A				
Interfaces	<input type="checkbox"/> Signal / communication interfaces: no; <input type="checkbox"/> Telecommunication interfaces: no; <input checked="" type="checkbox"/> Radio interfaces:Tipo: modulo WiFi ATWINC1500 (CE Report Number: D41009R1); <input checked="" type="checkbox"/> Other: no.				
Description	General use description: Environmental Quality Detector Modality of operation: Acquisition of environmental parameters via sensors, communication with wifi interface and remote data capture of scanned data.				
Configuration					
Connection Wires	CV	Port	Lenght	Schermato	Connection
	1	DC	1,5 m	NO	DC Cable (model WE 742 711 32)

Case



Setup Measurement



Calibration Test for Sensors

The test report includes the results of calibration for each sensor, based on the measurement algorithms that Nuvap applies to sensors. The calibration test verifies the main characteristics of each sensor, with respect to the technological and measurement limits. The main calibration tests are:

- sensitivity test
- linearity test on 3 measurement points
- Detection range test
- Measurement error

The tests are based on Average Value and Maximum Value . These values are the ambient concentrations of aerodynamic chemicals during a single measurement sample (Time: 15 minutes).

Determining the Recalibration Due Date

The Certificate of Calibration accompanying this product states the date when this unit was calibrated according to Nuvap procedures. It has been determined that the calibration of this product is not affected by its storage prior to its initial receipt by the customer.

The recalibration of this unit should be based on the date when the product is put into service, plus the recommended calibration interval.

Nuvap recommended calibration interval is 12 months. To determine the date for recalibration, the customer should use the appropriate start date, and apply either the Nuvap calibration interval, or an interval that satisfies their own organisation's internal quality system requirements.

For additional information please contact

Nuvap S.r.l.

Via Giuntini,13 | 56021 Cascina (PI), Italy | Phone: +39 050 7373018 | info@nuvap.com

Model

Serial Number

First service date

Annex A

Description of Sensors' characteristics and Calibration models

Electromagnetic Fields – HF

Characteristics	Value	Unit
Supply	5.0	V
Detection Range	0 - 10	V/m
Sensitivity	0,1	V/m
Linearity	±3	dB
Freq. Range	100 - 3000	MHz
Measurement Err.	-15 + 15	%
Certifier	Cubit - UniPi	

Electromagnetic Fields – LF

Characteristics	Value	Unit
Supply	5.0	V
Detection Range	0 - 15.000	nT
Sensitivity	1	nT
Linearity (±1G)	0.05	%FS
Freq. Range	40 - 100	Hz
Measurement Err.	-11 + 13	%
Certifier	Cubit - UniPi	

Noise Sensor

Characteristics	Value	Unit
Freq. Range	100 - 10000	Hz
Detection Range	30 - 120	dB (spl)
Sensitivity	1	dB (spl)
S/N Ratio	> 60	
Directivity	Omnidirect.	
Measurement Err.	12	%
Certifier	Univ. of Pisa	

Radon Sensor

Characteristics	Value	Unit
Supply	12	V
Detection Range	0 - 65.000	Bq/m ³
Sensitivity	1	Bq/m ³
Photoelement	Proprietary	
Measurement Err.	-10 +10	%
Certifier	ENEA	

Ionizing Radiation Sensor

Characteristics	Value	Unit
Supply	12	V
Detection Range	0,12 - 245	uS/h
Sensitivity	0,1	uS/h
Detection	beta, gamma	
Measurement Err.	-10 +10	%
Certifier	Univ. of Pisa	

Temperature

Characteristics	Value	Unit
Detection Range	-20 + 60	°C
Sensitivity	1	°C
Measurement Err.	7	%
Certifier	Pontlab	

Humidity

Characteristics	Value	Unit
Detection Range	0 - 100	%
Sensitivity	1	%
Measurement Err.	2-13	%
Certifier	Pontlab	

VOC Sensor (Air Pollutants)

Characteristics	Value	Unit
Supply	5	V
Detection Range	1 -100	% (100% is 30 ppm of EtOH)
Sensitivity	1	ppm
Measurement Err.	-15 + 15	%
Certifier	Univ. of Pisa	

Dust Sensor

Characteristics	Value	Unit
Supply	7	V
Detection Range	0-900	ug/m3
Sensitivity	1	ug/m3
Measurement Err.	-6 +6	%
Certifier	Univ. of Pisa	

Methane Sensor

Characteristics	Value	Unit
Supply	5	V
Detection Range	0 - 11000	ppm
Sensitivity	1	ppm
Measurement Err.	-12 + 12	%
Certifier	Univ. of Pisa	

Carbon Monoxide Sensor

Characteristics	Value	Unit
Detection Range	0 - 110	ppm
Sensitivity	5	ppm
Response time	<20	(t90)s
Measurement Err.	10	%
Certifier	Univ. of Pisa	

Carbon Dioxide Equivalent Sensor

Characteristics	Value	Unit
Detection Range	400 -3000	ppm
Sensitivity	20	ppm
Heating time	5	min
Measurement Err.	2 - 13	%
Certifier	Univ. of Pisa	

Formaldehyde Sensor

Characteristics	Value	Unit
Detection Range	0 - 6	ppm
Sensitivity	0.02	ppm
Response time	< 60	sec
Measurement Err.	7 - 10	%
Certifier	Univ. of Pisa	

TVOC Sensor

Characteristics	Value	Unit
Detection Range	400 -5000	ppB
Sensitivity	20	ppB
Heating time	5	min
Measurement Err.	2 - 13	%
Certifier	Univ. of Pisa	